

and those of sporadic occurrence as forms. The glabrous *Ranunculus abortivus* is predominantly southern, the pilose var. *acrolasius* is northern.⁷ Typical *Sphenopholis obtusata*, with leaves glabrous or scabrous, is irregularly dispersed over the eastern half of the United States, but is largely replaced by the pilose-leaved var. *pubescens* on the Coastal Plain and outer Piedmont.⁸ On the other hand, *Alnus rugosa* var. *typica*, with essentially glabrous leaves, ranges from Nova Scotia to Michigan, south to New England, Pennsylvania, and Indiana;

forma *emersoniana*, with leaves permanently pilose-tomentulose on the lower surface, is "of essentially the same range but forming individual and constant large colonies."⁹ *Veronica connata* and its var. *glaberrima* seem much more comparable to the examples cited as varieties than to that treated as a form.

Conclusion: the name *Veronica connata* Raf. is probably valid for the species described by Pennell as *V. catenata* and treated by Fernald as *V. salina* Schur; the eastern glandular phase and the western glabrous phase are better treated as geographic varieties than as forms.

⁷ FERNALD, *Rhodora* 40: 417-420. 1938.

⁸ FERNALD, *Rhodora* 43: 533. 1941.

⁹ FERNALD, *Rhodora* 47: 345-350. 1945.

ENTOMOLOGY.—*Revision of the genus Nysius in the United States and Canada (Hemiptera Heteroptera: Lygaeidae).*¹ H. G. BARBER, Roselle, N. J. (Communicated by P. W. OMAN.)

The genus *Nysius*² was described by Dallas in 1852 with 11 included species. Since that time several of these species have been transferred to other genera, but so many have been added that it has become a very large aggregation. Because of their general similarity and the wide dispersal of certain species considerable synonymy has resulted in the literature.

Stål, 1874, Horvath, 1890, Baker, 1906, and Usinger, 1942, have published complete or partial revisions of the genus; however, only that of Baker is restricted to the western world. Horvath's synopsis indicated some important characters, in addition to those mentioned by Stål for distinguishing the Palearctic species. In consequence, while the European species have been clearly recognized, some confusion has existed with reference to the application of certain specific names for forms occurring in the United States.

Both Uhler and Baker contributed to this confusion by failure to recognize the

true identity of several previously described species. Whatever may have been his earlier views Uhler, in his *Check list of Hemiptera Heteroptera of North America*, 1886, apparently expressed his latest ideas in regard to the valid specific names. He erroneously cited *ericae* Schilling as a synonym of *thymi* Wolff and listed both *raphanus* Howard and *destructor* Riley as synonyms of his *angustatus*. In his *Observations upon heteropterous Hemiptera of Lower California*, 1894, he redescribed William Howard's *raphanus* as *strigosus* and a year later in the *Preliminary list of the Hemiptera of Colorado*, 1895, he again described the same species as *minutus*. The synonymy of this species should be stated as follows: *N. raphanus* Howard, 1862 = *destructor* Riley, 1863 = *strigosus* Uhler, 1894 = *minutus* Uhler, 1895.

Baker, in his *Notes on the Nysius and Ortholomus of America*, 1906, made several glaring errors through failure to recognize the identity of the Uhler species and through omission of any mention of either *raphanus* or *ericae*. His *angustatus* is evidently a mixed species, containing both Uhler's true *angustatus* and *ericae*. Having failed to recognize Uhler's species he redescribed it as *coloradensis*. Also mistaking the nature of Uhler's *strigosus* he synonymy-

¹ Received May 6, 1947.

² It has been demonstrated by W. E. CHINA, *The generic names of British insects*, p. 243, 1943, and also by R. L. USINGER and R. I. SAILER, *Proc. Ent. Soc. Washington* 46: 260, 1944, that this generic name will have to be changed unless conserved by action of the International Commission on Zoological Nomenclature.

mized it with the European *senecionis* (Schilling). The *strigosus* of Baker, not being the species Uhler described from Lower California, must be given a new name.

Baker described a number of varieties, two of which can be validated either as distinct species or subspecies: *coloradensis grandis* seems to be specifically distinct; *californicus alabamensis* is a good geographical race or subspecies, as it is confined to a definite area in the Eastern States. However, *californicus* var. *providus* (not Uhler) is *basalis* Dallas (*inaequalis* Uhler), and *angustatus* var. *niger* is merely a dark form of *ericae* scarcely worthy of subspecific status.

The foregoing conclusions in regard to synonymy in the genus are arrived at not only from study of the authors' written descriptions but are confirmed by authentically labeled specimens in both the Uhler and Baker collections now in the United States National Museum. A single male specimen from "Col.," labeled *Nysius angustatus* by Uhler, and another from "N. R. R." (Northern Railroad), were probably from the series which the author had before him when he drew up the original description written in 1872. Three carded specimens, a male and two females, are labeled "mistaken for the chinch bug, W. R. Howard," and although the specific name is not added there is no doubt that these represent his *raphanus*. Four carded specimens from "MO." bear the label "Type," written by C. V. Riley; although the name label has become detached there can be little doubt that this is his *destructor*. Riley admits, in his Fifth Missouri Report of 1875, that this is the same species described earlier by Wm. Howard as *raphanus*, who upon request agreed to suppress his name in favor of that of Riley's. A specimen from "Cheyenne, June '69," and another "Colo." both from the Baker collection and labeled *N. minutus* in Uhler's well-known writing, prove to be the same as *raphanus*. Dr. R. L. Usinger some time ago informed me that the type (No. 543) of *strigosus* Uhler, 1894, from Lower California, contained in the collection of the California Academy of Sciences, is the same species which Uhler

later described as *minutus*. He kindly sent the cotype for confirmation. Other cotypes from the same series in the Uhler collection likewise confirm this synonymy. Thus, if it is conceded that *minutus* and *strigosus* are the same species and both synonymous with *raphanus*, it leaves *strigosus* of Baker, Horvath, Van Duzee, and others without a name. It should be mentioned here that some changes in synonymy are necessary in the Van Duzee Catalogue in order to conform to the foregoing opinions.

Another specific name of Uhler's will have to be placed in synonymy, as W. E. China, of the British Museum, has informed me by letter that *inaequalis* Uhler, 1894, from Grenada, West Indies, is the same as *basalis* Dallas, 1852, from Jamaica.

R. L. Usinger, who has examined the collection of *Nysius* deposited by Baker at Pomona College and has sent to me his notes on it, informs me that Baker attached red labels to certain specimens of his species, as follows: *californicus alabamensis*, *coloradensis*, and *grandis*. It was evidently his intention to consider these particular specimens as types of his species, but unfortunately this information remained unpublished and the specimens have no more than cotype value. It seems fitting to select these red-labeled specimens as lectotypes, as it was at Pomona College that Baker carried on his investigations in preparation for his *Notes on the Nysius and Ortholomus of America*. Many cotypes were also deposited in the United States National Museum which are noted later in the body of this article.

The writer received much information concerning the more important characters to be used in differentiating the species of *Nysius* from the very excellent treatment of the genus by R. L. Usinger, *The genus Nysius and its allies in the Hawaiian Islands* (Bernice P. Bishop Mus. Bull. 173, 167 pp., 1942).

Certain of the species are so closely related that use must frequently be made of relative rather than positive characters. Relative dimensions of body parts are utilized to a considerable extent. All such measurements were made with the small Zeiss binocular microscope, using the No. 4 ocular and Aa objective. Body propor-

tions are expressed in units equal to 0.0222 mm each.

Both in the discussion of the respective species and in the key only male specimens are referred to.

Thanks are due to Drs. E. A. Chapin and R. I. Sailer for the loan of many specimens from the U. S. National Museum collection, and again to the latter for much detailed information concerning the fixation of types for certain species; to W. E. China, of the British Museum, for comparison of specimens and for valuable information; and to Dr. R. L. Usinger, of the University of California, for reviewing this manuscript and for many helpful suggestions which have added to its value. The writer is indebted to Dr. G. Stuart Walley, Dominion Agricultural Department, Ottawa; to George A. Moore, of Montreal; and to J. F. Brimley, of Wellington, Ontario, for sending many specimens from various parts of Canada.

Nysius californicus Stål

Nysius californicus Stål, 1860, Freg. *Eugenies* Resa, p. 242; 1874, Enum. Hem. 4, p. 120.—Baker, 1906, Invert. Pacif. 1, pp. 134, 135.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 158.—Usinger, 1941, Brooklyn Ent. Soc. Bull. 36, p. 131.

Nysius major Berg, 1878, Anal. Soc. Cient. Argentina, p. 225; 1879, Hem. Argen., p. 101. (New synonymy.)

Nysius californicus is the largest species of the genus occurring in the United States, 5.50–7 mm long, reaching its maximum size in California and decreasing in size in its more easterly range through Texas, Kansas, Nebraska, and Missouri. It may be distinguished from all the other species except *basalis* by the much shorter bucculae which scarcely extend behind middle of the gular region of head. The costal margin of corium is distinctly contracted for a short distance at base, not more than a third the length of scutellum, thence very nearly straight to apex of corium. Length of head is very nearly equal to that of the pronotum. Lengths of the antennal segments are as follows: 0.4050, 0.7875, 0.6750, and 0.7875 mm, respectively. Genital segment of male is black, broadly margined with pale yellow.

Distribution: Western Canada and the entire western United States, Mexico, Central America, and South America south to Argentina.

Nysius californicus alabamensis Baker

Nysius californicus alabamensis Baker, 1906, Invert. Pacif. 1, pp. 135, 137.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 158.

This evidently should be maintained as a subspecies occupying a rather definite region in the eastern United States. Having an average body length of 4.75 mm (male), it averages smaller than the typical subspecies and also shows a somewhat darker shade of cinereous.

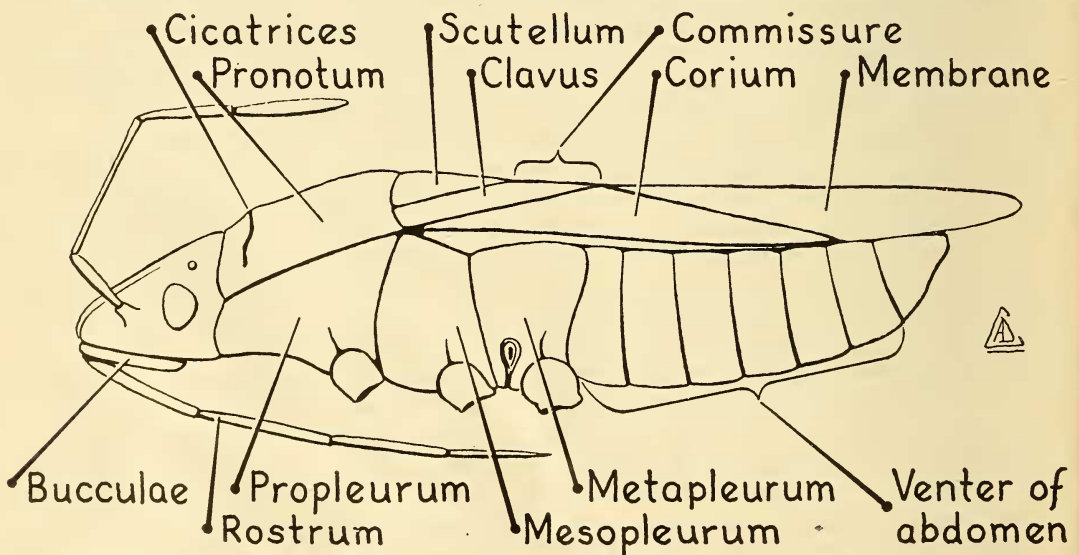


FIG. 1.—Diagrammatic lateral view showing essential parts used in descriptions.

The antennae are considerably shorter; the respective lengths of the segments are as follows: 0.315, 0.5625, 0.5175, and 0.675 mm.

Lectotype female: Auburn, Ala., VII-10-96 (C. F. Baker No. 2298), in the collection at Pomona College. Cotypes: Auburn, Ala., V-5-97 (C. F. Baker No. 2267), and Opelousas, La., IV-97 (C. F. Baker No. 2265), in the United States National Museum.

Distribution: From Ontario, Canada, on the north, through the New England States and eastern half of the United States to Florida and the Gulf States.

Dr. Harold Morrison collected this form in the Dominican Republic in 1917, and Dr. S. C. Bruner has a single specimen collected by J. Acuña in the province of Oriente, Cuba.

Nysius basalis Dallas

Nysius basalis Dallas, 1852, List Hem. Brit. Mus. 1, p. 553.—Barber, 1923, Amer. Mus. Nov. 75, p. 12.—Blatchley, 1926, Heter. East. N. Amer., pp. 351, 352.

Nysius (?) *ementitus* Distant, 1893, Biol. Centr.-Amer., Rhynch., 1, Suppl., p. 385, tab. 34, fig. 9.

Nysius inaequalis Uhler, 1894, Proc. Zool. Soc. London, p. 183.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 158 (exclude Baker).—Barber, 1939, Sci. Surv. Porto Rico 14, pp. 340, 341.

Nysius californicus providus, Baker³ (not Uhler), 1906, Invert. Pacif. 1, p. 137.

Nysius basalis is about the size of *alabamensis* Baker. The color yellow-testaceous rather than cinereous, with the fuscous markings less evident, often more or less effaced. It agrees with *californicus* in having short bucculae, but the costal margin of the corium is scarcely if at all contracted at base and the entire outer costal margin is gently arcuate rather than straight. Posterior disk of the pronotum with a distinct, short, smooth, longitudinal callosity on either side of middle. Pronotal cicatrices are either concolorous or frequently reduced to four short fuscous marks. Most frequently in the darker forms a narrow, smooth, pale line extends from the middle of the vertex of head through the middle of the pronotum and scutellum. Veins of the corium sometimes only faintly spotted. The membrane is clear, transparent, occasionally with a faint, fuscous, apical streak. Genital segment of the male is either entirely pale yellow or sometimes with a slight fuscous area at base.

low or sometimes with a slight fuscous area at base. Antennae are either entirely pale or the basal and terminal segments, as well as the bases of the second and third, lightly infuscated. Length, male, 4.70 mm.

Distribution: Dallas described this species from Jamaica and Brazil. Uhler described the same species as *inaequalis* from Grenada, West Indies, nine cotypes of which are in the collection of the United States National Museum; the type series is in the British Museum. Other specimens have been examined from the following localities: Jamaica, Dominican Republic, Haiti, Puerto Rico, St. Thomas, Cuba, Antigua, Guadeloupe, all in the West Indies; Mexico, Costa Rica, Honduras, Guatemala, Colombia, Trinidad, and northern Brazil. In the United States this species, from the evidence at hand, is restricted to Florida and the Gulf States.

W. E. China, of the British Museum, has kindly sent me a paratype of Distant's *ementitus* from Guatemala, labeled B. C. A., Cerro Zunil, 4000–5000 feet (Champion). A comparison of this with a cotype of *inaequalis* from Grenada shows that the names are synonymous.

In addition to the synonymy indicated above there is the possibility that *N. callifer* Stål from Colombia may have to be added to the list.

Nysius adjactor, n. sp.

Color darkened cinereous, marked with fuscous as follows: Head broadly on either side of a narrow, pale, longitudinal, median fascia, cicatrices and punctures of the pronotum, scutellum, except the extreme apex, apices of the clavi, rather obscure maculae on the veins and along the posterior margin of the corium, spots on the femora and the bases of the tibiae.

Head nearly one-fifth wider than long (42:34); bucculae short, scarcely exceeding anterior margins of eyes. Antennae 1.86 mm long; second segment nearly one-third longer than basal, second and fourth subequal, each a fifth longer than third segment. Pronotum about one-third wider than long; cicatrices wide, conspicuous, connected in the middle; dorsum coarsely punctate. Scutellum nearly one-fourth wider than long (32:25), coarsely punctate at base and along the sides. Corium coated with fine, inclined hairs; basal costal

³ In my copy of Baker's reprint the author has written, "The specific names *providus* and *inaequalis* should be interchanged wherever they occur."

margin not noticeably contracted but densely pilose; the outer margin gently rounded from base to apex. Membrane well extended beyond apex of the abdomen, hyaline, faintly smudged with fuscous along the middle; that portion which is beyond the apices of the coria is distinctly longer than the basal portion. Length, male 4, female 5 mm.

Type male: Chisos Mountains, Texas, VII-17-46 (collected by D. J. and J. N. Knull). Paratype female: Same data as type. Both in the collection of the Department of Zoology and Entomology, Ohio State University. Paratypes male and female: Guadalajara, Jalisco, Mexico, September 1903 (writer's collection).

This species with the short bucculae is rather closely related to *basalis*. I have been informed by Mr. China, of the British Museum, that W. L. Distant had this particular species mixed with his series of *ementitus* which I have made a synonym of *basalis*. Besides a difference in coloration it is somewhat smaller and narrower than *basalis*, with little evidence of longitudinal callouses on the disk of the pronotum.

***Nysius angustatus* Uhler**

Nysius angustatus Uhler, 1872, 5th Ann. Rep. Geol. Surv. Terr. for 1871 (Hayden's Survey), p. 406; 1886, Check List Hem. Het., p. 13 (exclude synonyms).

Nysius coloradensis Baker, 1906, Invert. Pacif. 1, p. 136.

Nysius ericae Van Duzee, 1917, Cat. Hem. N. Amer., p. 159 (part).—Blatchley, 1926, Heter. East. N. Amer., p. 353 (part).

Color cinereous, marked with fuscous much as in *ericae*. The following parts more or less strongly marked with fuscous: Ocellar region of the head, pronotal cicatrices, scutellum along the middle region, spots on veins of the corium and also two conspicuous fascia on the posterior margin. Genital segment of male black narrowly margined with pale yellow. Membrane clear with ill-defined faint markings on the disk. Antennae testaceous, with the basal and apices of the second and terminal segments darker.

Head about one-fourth wider than long (45:32), lightly convex transversely. Antennae 2.03 mm long; basal segment somewhat incrassate, extended beyond apex of head by about one-fourth of its length; second segment about twice as long as basal; third segment one-fourth shorter than second and terminal

subequal to second. Bucculae strongly elevated, gradually narrowing to end abruptly at base of head. Basal segment of rostrum not quite attaining apices of the bucculae. Pronotum about as long as the head (32:32), much wider than long (45:32); lateral margins lightly concave; cicatrices sharply defined, narrowly black. Scutellum about one-fifth wider than long (28:20). Costal margin of corium contracted at base for a distance equal to about two-thirds the length of the scutellum thence distinctly expanded and gently rounded to apex. Length, male, 4.25–4.50 mm.

Lectotype male: "Col.," labeled *Nysius angustatus* by Uhler. Cotype: "N. R. R." (Northern Railroad). Both from the Uhler collection in the United States National Museum.

Distribution: Across entire Dominion of Canada from Quebec to British Columbia; northern United States from Maine to Oregon and Washington. Not yet seen from California, but it should occur in the northern part of that state. Its southern limits seem to be in northern Kansas.

Lectotype of *coloradensis* Baker, female: Foothills, 5 miles west of Fort Collins, Colo., VIII-4-95 (C. F. Baker No. 1593), in the Baker collection at Pomona College.

Cotypes, males and females: Foothills west of Fort Collins, Colo., VIII-11-96 (no. 887); Steamboat Springs, Colo. VII (1329); foothills west of Fort Collins, Colo., VII (1370, 1371) and VII-10-96 (2325); Fort Collins, Colo., V-16-95 (1524); VI-13-95 (1563); VIII-20-95 (1604); VIII-8-96 (2632); VIII-27-96 (2084); VI-16-96 (2170); Camptons, Colo., VII-21-95 (1580); Morris Ranch, Laramie County, Colo., VII-11-96 (2009); mouth of Big South, Laramie County, Colo., VII-12-96 (2011); Grizzly Creek, Laramie County, Colo., VII-19-96 (2012); Forresters, Laramie County, Colo., VIII-3-96 (2013, 2020); Rabbit Ears Pass, VII-2-96 (2019); Spicers, North Park, Colo., VII-18-96 (2024); Chambers Lake, Colo., VIII-1-96 (2033) and VII-13-96 (2253); Cameron Pass, Colo., VII-31-96 (2037) and VII-30-96 (2150); Hardys Ranch, North Park, Colo., I-29-96 (2061); Elkhart, Ind., VIII-29-96 (2087); Toronto, Canada, IX-30-96 (2038) and V-25-96 (2142). All cotypes in the collection of the United States National Museum.

Two of Baker's cotypes of *coloradensis* are from Toronto, Canada, showing that he recog-

nized these as the same as his Colorado form, from whence most of his material came. The writer has received many specimens of *angustatus* Uhler (= *coloradensis* Baker) from Quebec, Ontario, Saskatchewan, Manitoba, Alberta, and British Columbia in Canada. It has often been confused with both *ericae* and *thymi*.

Nysius grandis Baker

Nysius coloradensis grandis Baker, 1906, Invert. Pacif. 1, p. 136.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 160.

Although closely related to *angustatus* differences in coloration as well as in relative size and shape of parts indicate that *grandis* should be given specific rank. In this species the differences are for the most part relative rather than positive.

Color darker than *angustatus*, often rusty fuliginous, the fuscous markings more conspicuous. Other noticeable differences are: Fuscous cicatrices of the pronotum are broader, more conspicuous and less sharply defined; pronotum posteriorly more coarsely punctate; scutellum black, devoid of a pale area on either side of the middle; veins of corium and the posterior margin more heavily splotched with fuscous; membrane less clear, faintly tinged with brown and the fuscous spots more evident; femora more profusely spotted.

Compared to *angustatus* the head is wider (50:35), the vertex flatter, the eyes appearing a little larger; the bucculae are similar, but the basal segment of the rostrum usually extends to the apices of the bucculae; the antennae are definitely longer; the pronotum is flatter and not so noticeably depressed anteriorly, also appearing more quadrate (38:38:60); the costal margin is a little more flaring posteriorly. Length, male, 4.80–5.00 mm.

Lectotype male: Rabbit Ears Pass, Colo., VIII-4-95 (Baker No. 2019), in the Baker collection at Pomona College. Cotypes, males and females: Chambers Lake, Colo., VII-18-95 (No. 1582) and VIII-1-96 (2033); Fort Collins, Colo. (1733); Morris Ranch, Laramie County, Colo., VII-11-96 (2009); mouth of Big South, Laramie County, Colo., VII-12-96 (2011); Rabbit Ears Pass, Colo., VII-21-96 (2019) and VII-20-96 (2270); Four Mile Hill near Steamboat Springs, Colo., VII-21-96 (2030); 5 miles west Cameron Pass., Colo., VII-29-96 (2041). All cotypes are in the Baker collection at the United States National Museum.

Distribution: Because of lack of sufficient evidence the exact limits of the range are uncertain. So far as the writer's records go this species is confined to the higher altitudes with an extended range from Churchill, Manitoba, on the north to Arizona in the United States and through Mexico to Panama. A single female specimen from the Biologia Centrali-Americana material in the United States National Museum is labeled Volcán de Chiriquí (Panama), 4,000 to 6,000 feet.

Nysius thymi (Wolff)

Lygaeus thymi Wolff, 1804, Icon. Cim. 4, p. 149, tab. 15, fig. 142; 1804, Abblg. Wanz. 4, p. 147, tab. 15, fig. 143.

Nysius thymi Horvath, 1890, Rev. d'Ent. 9: p. 188.—Van Duzee, 1917, Cat. Hem. N. Amer. (part).

Nysius angustatus, *grandis*, and *thymi* constitute a group of closely related species resembling each other superficially and not always easy to separate through reference to structure alone. As expressed elsewhere distinctions are often more relative than positive.

In general, *thymi* will average smaller than *angustatus* and is darker, being more rusty cinereous in color. The preocular part of the head is only slightly longer than an eye (16:14), while in *angustatus* this is about 17:13; the antennae are equal in length to those of *angustatus* but definitely shorter than in *grandis*; the bucculae are distinctive, being rather high anteriorly and narrowing posteriorly to end a little before base of head, not at base as in *angustatus*. Scutellum, except at extreme apex, black. Although somewhat variable the contracted basal part of the costal margin is usually a little longer in relation to the length of scutellum. Membrane faintly infused with brown, splotched along the middle with fuscous. Length 3.60–4.00 mm.

Distribution: As a very limited number of specimens of this species have been seen by the author, the delimitation of its range in North America will have to wait for more evidence. Specimens are at hand from Wanakena, Cranberry Lake (C. J. Drake), and from near Sabael, Indian Lake, in the Adirondack Mountains, Keene Valley in Essex County, and Mountain View in Franklin County, all in New York State. Through Dr. G. Stuart Walley, of Ottawa, specimens have been received from Thunder River and Natashquan in Quebec, Canada, near the mouth of the St.

Lawrence River. Anse au Griffon, Quebec (J. M. Aldrich).

N. thymi is a Palearctic species occurring across northern Europe and Siberia. From the evidence at hand it reached the North American continent by way of the northeast rather than the northwest from Siberia.

Nysius ericae (Schilling)

Heterogaster ericae Schilling, 1829, Beitr. Ent. 1, p. 86, pl. 7, fig. 10.

Nysius thymi, Uhler, 1886, Check List Hem. Het., p. 13 (part).

Nysius ericae, Horvath, 1890, Rev. d'Ent. 9, p. 186.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 159 (part).—Blatchley, 1926, Heter. East. N. Amer., pp. 351, 353, fig. 14 (excl. syns.).

Nysius angustatus, Baker (not Uhler), 1906, Invert. Pacif. 1, p. 135 (part).

Nysius angustatus niger Baker, 1906, Invert. Pacif. 1, pp. 135, 136. (New synonymy.)

Color cinereous. Punctations and fuscous markings similar to *angustatus*, the punctures on the pronotum often arranged in five irregular, longitudinal series; scutellum except extreme apex, black, occasionally with a vague, pale spot on either side of middle; corium having fine, appressed pubescence, nearly devoid of erect hairs; veins very lightly spotted; membrane clear, very faintly if at all spotted. Genital segment of the male entirely black or more rarely with a very narrow pale margin.

Head about one-third wider than long (42:26); eyes less projecting than in *angustatus*. Antenna with the short basal segment scarcely exceeding apex of head; second segment about twice as long as basal, third a little shorter than second and the terminal either subequal to or a little longer than the third segment (12:25:20:25). Bucculae less elevated than in *angustatus*, gradually narrowing in height to terminate at a point before base of head. Pronotum nearly one-third wider than long (50:30), subequal to or a little longer than head; across posterior margin one-fifth wider than head across eyes. Scutellum much wider than long (33:23). Corium rather opaque. Costal margin contracted at base for a distance equal to two-thirds the length of scutellum, thence very little expanded and gently rounded to apex. Costal margin at base sparsely pilose; the general surface usually devoid of erect hairs. Membrane only slightly surpassing apex of abdomen in the male, more extended in the female, but less so in both sexes than in *raphanus*.

nus. Basal part of membrane between commissure and apices of coria subequal to the apical part behind apices of coria.

Distribution: *N. ericae* is a Holarctic species with a very wide range in Europe, northern Africa and parts at least of central Asia. In North America it occurs in the entire Dominion of Canada from New Brunswick to British Columbia and in the United States across all the northern States from Maine to Washington, Oregon, and northern California. In the region of Kansas it overlaps the range of *raphanus* which replaces the above species through the southern states.

As stated above in the synonymy of the species it has been much confused with *angustatus*. It differs from *angustatus*, besides being smaller, in having less elevated bucculae which do not terminate so abruptly but taper off to end at a point before base of head. It is more closely related to *raphanus*; however, the latter has a shorter pronotum and longer hemelytra, with the membrane more extended beyond the end of the abdomen. Length, male, 3.25–3.70 mm.

It should be recorded here that the lectotype of *angustatus niger* Baker, a synonym of *ericae*, is a female labeled "Wash. No. 2508" in the Baker collection at Pomona College. Four cotype females, with the same data, are in the Baker collection in the United States National Museum.

Nysius raphanus Howard

Nysius raphanus Howard, 1872, Southern Farmer 6, p. 273, 1872, Can. Ent. 4, p. 219.

Nysius destructor Riley, 1873, 5th Rep. Insects Missouri, p. 113.

Nysius strigosus Uhler, 1894, Proc. California Acad. Sci. (2) 4, p. 238. (New synonymy.)

Nysius minutus Uhler, 1895, Hem. Colorado, p. 22.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 160. (New synonymy.)

Nysius angustatus minutus, Baker, 1906, Invert. Pacif. 1, p. 137 (listed).

Nysius ericae, Milliken (not Schilling), 1918, Journ. Agr. Res. 13, pp. 571–578, pls. 60, 61.

Coloration and facies resemble *ericae* very closely. Head is about one-third wider than long (30:20). The antennae are shorter than in *ericae*, basal segment barely exceeds apex of head, lengths of the segments are 10:22:18:26. Bucculae lightly elevated, gradually narrowing posteriorly to end in a point before base of head, much as in *ericae* but not so abruptly terminating as in *angustatus*. Pronotum is

noticeably short, often nearly twice as wide as long, in the male (45:23), little longer than head. Scutellum, except at extreme apex, is usually black, much wider than long (23:15). Costal margins of coria are very nearly straight in the male and parallel to each other, less expanded, even in the female, than in *ericae*. Membrane clear, appearing longer than in *ericae* as it extends farther beyond the tip of the abdomen. The apical part of the membrane is distinctly longer from the apices of the coria than the basal part of membrane before these. Genital segment of male usually entirely black. Smaller than *ericae*, 3.10–4.00 long.

Lectotype male: From Wm. Howard's set of three (carded), labeled "mistaken for the chinch bug." United States National Museum.

Lectotype *destructor* Riley: Male from C. V. Riley's set of four (carded), labeled "Type," United States National Museum.

Lectotype *minutus* Uhler: Male, "Colo. No. 1684," labeled *Nysius minutus* by Uhler, United States National Museum.

Type and cotypes of *strigosus* Uhler are in the collection of the California Academy of Sciences. Cotypes in the United States National Museum.

Distribution: Throughout all the southern states from Virginia south to Florida, and west across the United States to southern California, with some extension into Mexico. In its northern limits it overlaps the more northern *ericae*.

Through a misidentification Uhler labeled a specimen from Cheyenne, Wyo., June 1869, as *angustatus* Uhler. This specimen was erroneously selected as the type of that species under catalogue No. 693 in the United States National Museum. Since no Wyoming locality is mentioned in the original description it is clear that the specimen is not part of the cotype series of *angustatus*.

Nysius monticola Distant

Nysius (?) *monticola* Distant, 1893, Biol. Centr.-Amer., Rhynch. 1, Suppl., p. 385, tab. 36, fig. 8.

Color dark cinereous, with ground color of head and pronotum brownish red, heavily marked with fuscous on either side of head, and anteriorly on the pronotum. Corium opaque, the surface having a dense coating of short, appressed silvery hairs, interspersed with some scattered longer, erect hairs, the costal margin of corium appearing clearer in contrast; veins

much spotted with fuscous. Scutellum, except at extreme apex, black. Ventral segments of abdomen of male as well as the genital segment, black, with slight indications of testaceous maculations. Membrane spotted with fuscous.

Head one-fourth wider than long. Pronotum two-fifths wider than long and subequal to length of the head. Scutellum one-third wider than long. Antennae with second segment twice as long as basal, second and fourth segments subequal. Contracted basal part of corium equal to length of the scutellum. Basal part of membrane from apex of commissure to apices of coria is but little shorter than the apical part of membrane behind these apices. Length, male, 3.80 mm.

More closely related to *ericae* than to other species of *Nysius* but is much darker and more pubescent than that species.

A specimen from Bright Angel Camp, Ariz., elevation 6,900 feet, collected by Wickham, was sent to W. E. China, of the British Museum, for comparison with the type. He writes that while this specimen strongly resembles Distant's type the relation of the width of the head to its length does not agree. I have since made measurements of a number of Mexican and Arizona specimens and find that the range of variability in this respect is considerable.

Distribution: Guatemala (Distant): Temescaltepec and Cuajimalpa, Mexico (R. L. Usinger); Chiricahua Mountains, Peach Springs, and Springerville, Ariz.; Beulah, N. Mex.; Brewster County, Tex., in the collection of the California Academy of Sciences; Huachuca Mountains, Ariz.; Palmer Lake and Trinidad, Colo. (writer's collection); specimens from Arizona and Colorado in the collection of the United States National Museum.

Nysius tenellus, n. sp.

Nysius senecionis, Baker, 1906, Invert. Pacif. 1, pp. 135, 136, 137 (not Schilling).

Nysius strigosus, Horvath (not Uhler), 1908, Ann. Mus. Nat. Hungarici 6, p. 558.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 160.—Barber, 1939, Sci. Surv. Porto Rico 6, pp. 340, 342.

Typical pale form: Color pale yellow testaceous; punctations for the most part concolorous. The following parts fuscous: Head on each side with an abbreviated fascia extending anteriorly from base of head to a short distance before the ocelli, cicatrices of pronotum, depressed base of the scutellum, four rather inconspicuous spots on the posterior margin of

corium; ventrally with an irregular spot on both the pro- and mesopleura, the meso- and metasternum, and the basal half of the venter. Legs vaguely, if at all, spotted.

Head much wider than long (35:25); eyes less projecting than in *ericæ*. Bucculae rather strongly elevated throughout, the lower edges very nearly straight, ending abruptly at base of head. Antennae about as long as head, pronotum, and scutellum united, basal segment short, scarcely surpassing apex of head; second segment twice as long as basal, third somewhat shorter than second and terminal subequal to the second segment (10:23:20:23). Pronotum finely, closely punctate, nearly one-third wider than long (46:30), a little longer than the head and about one-third wider across humeri than head across eyes (46:35), seen from the side distinctly depressed in the region of the cicatrices which are narrow and disconnected in the middle. Scutellum nearly one-third wider than long (28:20), apical carina distinctly elevated. Corium hyaline, glabrous; veins plainly elevated and immaculate; costal margins contracted at base and parallel to each other for a distance equal to the length of the scutellum thence slightly flaring and gently rounding to apices; contracted part devoid of fine pile or hairs. Membrane hyaline, immaculate. The basal part of the membrane from the apex of the commissure to apices of the coria is distinctly shorter than the apical part beyond the apices of coria. Length 3.60–4.00 mm.

Atypical dark form: In some parts of the range of the typical form there occurs a darker variety, possibly a seasonal form, in which the punctations and fuscous markings are very much more pronounced, causing it to resemble *ericæ* very closely in general appearance. However this variety can very readily be distinguished from *ericæ* by the same structural differences as shown in the typical form. Specimens of this dark variety have been seen from California, Washington, and Utah.

Distribution: In western North America it ranges from British Columbia south through all of the Rocky Mountain States and west to California. In the southern United States it occurs in western Texas, Arizona, New Mexico, and Florida, and south through Mexico and Central America. In the West Indies it is found at least in Haiti and Puerto Rico.

Type male and allotype: Santa Clara County, Calif., Baker (U. S. Nat. Mus.).

Paratypes, males and females: ARIZONA: 1, Chiricahua Mountains, VIII-10-07 (Webb); 1, Stone Cabin Canyon, Santa Rita Mountains, VIII-25-13 (Pierce), on pink *Sphaeralcea*; 9, Tucson, VIII-11-14 (Coad), on peach; 5, Tucson, V-6 (Hubbard); 5, Tucson, XII-20 (Hubbard); 37, Sabino Canyon, IV-23-40 (Oman); 5, Patagonia, VIII-23-37 (Andre); 20, Chiricahua Mountains, VI-9-33 (Oman); 3, Yarnell Heights, VI-29-33 (Oman); 4, Phoenix, V-27-38 (Christenson); 2, Mesa, IX-10-38 (Christenson); 1, Glendale, VIII-5-38 (Christenson); 1, Nogales, Santa Cruz County, IX-20-06 (Nunnenmacher); 1, Tucson, 6-16-33 (Oman); 2, Tucson, V-27-1896 (Kunze); 4, Tucson, 4-30-1896 (Kunze); 9, Prescott, V-15-1896 (Kunze); 2, Tucson, V-27-1896 (Kunze); 1, Tucson, V-20-1896 (Kunze); 3, Arizona (Uhler collection); 8, Monte Vista, altitude 9,000 ft., Chiricahua Mountains, VII-10-19 (Whetmore); 6, Sasabe, X-17-37 (Oman); 10, Mount Lemmon, VIII-23-37 (Andre); 3, Williams, VIII-13-37 (Andre); 11, Oak Creek Canyon, VIII-6-38 (Christenson); 1, Flagstaff, V-31-35 (Oman); 2, Granite Dells, V-30-37 (Oman); 9, Yarnell Heights, V-31-35 (Oman); 1, Oak Creek Canyon, IV-8-40 (Christenson); 3, Congress Jet., VI-28-33 (Oman); 1, Tucson, VI-18-33 (Oman); 1, Fort Huachuca, VI-10-33 (Oman); 1, Tubac, VI-24-33 (Oman); 2, Tucson (Webb); 1, Santa Rita Mountains, IV-25-40 (Oman); 1, Santa Cruz River near Tubac, X-23-37 (Oman); 3, Williams, VII-24-05 (Barber & Schwarz); 1, Williams, V-27-05 (Barber & Schwarz); 1, Williams, VII-1-05 (Barber & Schwarz); 1, Williams, VI-3-05 (Barber & Schwarz); 1, Bright Angel, Colorado Canyon, V-5-05 (Barber); 1, Palo Verde, VI-11-19 (Whetmore); 1, Littlefield, II-15-32, *Chrysothamnus speciosus* (Davis); 1, Williams, VII-11-18 (Whetmore); 1, Mount Graham, V-3-14 (Holt).

MEXICO: 1, Mexico City, VI-21-1897 (Barrett); 1, Juárez, VII-3-1897 (Morse); 1, Sacramento, X-1896; 2, Mexico, intercepted at Brownsville, IV-22-36, on Shasta daisies; 2, Mexico, intercepted at Brownsville, IV-24-36, in lilies; 2 Mexico, intercepted at Brownsville, X-29-36, on chrysanthemums; 2, Mexico, intercepted at Brownsville, V-8-37, on Shasta daisy; 1, Mexico, intercepted at Brownsville, V-1-36, in lilies; 2, Mexico, intercepted at Laredo, Tex., II-18-34, on feverfew; 1, Mexico, intercepted at Brownsville, X-30-38, chrysan-

themums; 1, Mexico, intercepted at El Paso, Tex., XI-12-40, med. herbs; 2, Mexico, intercepted at El Paso, Tex., X-31-40, chrysanthemums; 2, Mexico, intercepted at Brownsville, III-25-40, Manzanilla; 1, Nogales, Sonora, intercepted at Nogales, Ariz., VI-5-41, cut flowers; 1, Nogales, Sonora, intercepted at Nogales, Ariz., VI-21-41, cut flowers; 1, Victoria, III-16-22 (Holloway & T. C. Barber); 2, Cuernavaca, Mor., II-1945 (Krauss), on flowers of *Eupatorium adenophorum*; Tamasopa, 1, VII-4-09 (Bishopp); 1, San José de Guaymas, IV-10 (L. O. Howard).

HONDURAS: 1, La Ceiba, IX-11-16 (Dyer).

HAITI: 5, Haiti (W. A. Hoffman).

PUERTO RICO: 2, Santurce, V-19-34, on *Pluchea purpurascens*.

All in the collection of the United States National Museum.

CALIFORNIA: 11, Taylorville, VIII-11-37; 22, Pasadena, II-20-28; Palo Alto, IV-30-28 (H. G. Barber); Inyo Mountains, VII-7/11 (Wickham); San Diego County, IV-7-13 (Van Duzee); San Antonio Canyon, Ontario, VII-27-07; Santa Clara County, V-1902. ARIZONA: Huachuca Mountains, VII-8/15-05 (H. G. Barber); Sabino Canyon, Santa Catalina Mountains (Knight); Phoenix, IX-25-02, and Prescott, VII-15-1898 (Palm). In the collection of the writer.

All the following additional material is in the collection of the National Museum:

UTAH: 1, Provo, X-22-38 (Christenson); 1, Logan Canyon, IV-21-41 (Knowlton & Nye); 1, Promontory, X-6-14 (Whetmore); 1, Provo, VIII-23-36 (Christenson); 1, Lehi, IX-1905 (Hooker); 1, Spanish Fork, VIII-21-38 (Hardy); 2, Moab, X-25-38 (Christenson); 1, American Fork Canyon, VI-23-1891; 2, Alta, 10,000 ft., VI-30-1891 (Uhler collection); 1, Willard, X-5 (Whetmore).

COLORADO: 1, Steamboat Springs, July (Baker); 1, Elk River, July (Baker).

WASHINGTON: 1, Wenatchee Mountains, VII-9-30 (Rolf); 1, Mount Rainier, VII-17-37 (Benmion); 1, Yakima (Uhler collection); 7, Orville, X-9-40 (Christenson); 5, East Wenatchee, X-5-46 (Christenson); 2, Cheney, X-1-32 (Rodock), *B. tectorum*; 5, Clarkston, XI-23-32 (Rodock), rabbit brush *Chrysothamnus*; 4, Pullman, VII-23-08 (Mann); 1, Hunts Junction, IX-13-04 (Titus); 2, Pasco, IX-11-04 (Titus).

OREGON: 1, north of Bend, VII-2 (Oman); 1, Corvallis, VIII-8-31; 1, Echo, VII-15-04

(Titus); 11, Hood River, IX-21-07 (Morse).

IDAHO: 2, Twin Falls, VII-2-28, *Beta vulgaris*; 1, Blackfoot, VI-22-04 (Titus).

BRITISH COLUMBIA: 1, Kaslo, VII-16 (Caudell); 1, Vancouver Island (Uhler collection).

WESTERN TERRITORIES: 6 (Uhler collection).

CALIFORNIA: 6, Santa Cruz Mountains; 1, California (Uhler collection); 4, Taylorville, Marin County, VIII-11-37 (H. G. Barber); 4, Los Angeles County, July; 15, Calipatria, X-28-21 (Kalmbach); 3, Mojave, XI-11-14 (Whetmore); 1, Tulare County, VI-6-09 (Davidson), *Helianthus*; 1, Cajon, VIII-9-37 (Harris); 2, Spreckels, IX-20-04 (Titus), sugar beets; 1, Ontario (Osborn); 2, Claremont (Baker); 1, Holtville (Wildmuth); 2, Hemet, VIII-15-39 (Christenson), *Erigeron canadensis*; 7, Three Rivers, VI-9-35 (Oman); 3, Fieldbrook, V-29-03 (H. S. Barber); 1, Los Angeles, April (S. O. Howard); 1, Cajon Pass, V-6-35 (Oman); 3, near Tehachapi, VI-8-35 (Oman); 2, east of Jacumba, VI-1-35 (Oman); 6, Sequoia National Forest, Hospital Rock, VI-11-35 (Oman); 4, Tehachapi, VIII-2-1897 (Morse); 5, Los Angeles, VII-29-1897 (Morse); 5, Los Angeles, VII-21-1897 (Morse); 2, San Bernardino, VII-18-1897 (Morse); 1, Yosemite Valley, VIII-10-1897 (Morse); 1, Berkeley, VIII-20-1897 (Morse); 1, Lancaster, VII-31-1897 (Morse); 1, Baden, VIII-24-1897 (Morse); 9, Santa Clara County (Baker); 5, Garden Grove, XII-28; 1, Laguna Mountains, San Diego County, VIII-21-19 (Pierce), *Artemisia tridentata*; 2, Tamalpais, 2,500 ft., XI-15-1899 (L. O. Howard); 9, Yucaipa, VI-7-38 (Christenson); 2, Echo Lake, VII-23-33 (Zimmermann); 7, Banning, II-14-39 (Christenson); 1, Mather, VII-4-32 (Zimmermann); 1, head of Virginia Canyon, Yosemite Park, 10,000 ft., VIII-5-39, ex *Poa leibergii* (Usinger); 2, Salinas, VIII-26-42, (Lange), *Parthenium argentatum* Gray; 1, Scotia, V-5 (H. S. Barber).

NEVADA: 6, Ormsby County, July (Baker).

NEW MEXICO: 10, Mesilla Park, V-25-09 (Ainslie); 2, Organ, VI-8-33 (Oman); 1, Las Cruces, VII-1903 (Cockerell), on alfalfa; 1, Cloudercroft, VI-7-33 (Oman).

TEXAS: 3, Bangs, X-17-39 (Christenson); 1, Brownsville, V-17-39, intercepted on feverfew; 1, Brewster County, Chisos Mountains, VI-10-08 (Mitchell & Cushman); 2, Brownsville, V-31-33 (Oman); 2, Sanderson, VI-5-33 (Oman); 2, Bexar County, XI-28-38 (Turner).

Nysius insoletus, n. sp.

Color pale yellow-testaceous with the following fuscous markings: A rather wide longitudinal fascia on each side of the head extending from the base to the apex of the antenniferous tubercles, a spot behind eyes, terminal segment of antenna, cicatrices of pronotum, lateral angles and median longitudinal fascia of the scutellum, very obscure spots on the veins and along the posterior margin of the corium; beneath, with the head vaguely on each side of the bucculae, a large median spot on the propleurum and a narrow longitudinal line above this, center of the mesopleurum, a narrow longitudinal line above the evaporating surface of the metapleurum and the meso- and metasternum, broad base of the venter in the male and frequently a lateral longitudinal fascia extending from the base to the genital segment; faint spots on the femora.

Head nearly one-third wider across eyes than long (57:38); eyes strongly protruding beyond the anterior angles of the pronotum; vertex two and three-fourths times wider than an eye (33:12); bucculae very greatly elevated throughout, ending abruptly at base of head, the lower edges straight. Antenna with the basal segment extending beyond apex of head by nearly one-half of its length, second segment just over twice as long as basal, third and fourth segments nearly equal in length, each about one-third shorter than second, relative lengths are as 20:44:30:32. Pronotum just over one and one-half times wider than long (68:40), coarsely punctate, much wider across humeri than head across eyes (68:57); lateral margins distinctly, concavely arcuated opposite the cicatrices which are clean-cut, disconnected in the middle and not quite reaching the lateral margins on each side. Scutellum nearly one-fourth wider than long (40:30), coarsely punctate, strongly depressed at base; apical carina distinct. Corium opaque; very sparsely covered with fine recurved hairs; veins strongly elevated; R+M distinctly forked before base of the membrane; costal margins contracted at base and there parallel to each other for a distance equal to the length of scutellum, thence strongly flaring and gently rounding to apices of the corium; this contracted part with a few fine hairs, frequently abraded. Membrane hyaline, extending but little beyond apex of abdomen, its outer mar-

gin a little less than half as long as the costal margin. Length 5.00–5.75 mm.

Type males: Plain City, Utah, VIII-5-03. Six paratypes, males and females, as follows: Four with the same data as the type; one, mouth Bear River, Utah, XI-30-14 (A. Wetmore); one, Chambers' Lake, Larimer County, Colo., VII-13-1896 (Baker). All in U.S.N.M.

Distribution: Only the specimens mentioned above have been seen. Its complete range will be made known by further collecting.

This species is most closely related to *angustatus* from which it can best be distinguished by difference in color, size, more elevated bucculae, longer antennae, and more distinctly elevated veins of the corium.

Nysius groenlandicus (Zetterstedt)

Lygaeus groenlandicus Zetterstedt, 1840, Ins. Lapon., p. 262.

Nysius groenlandicus, Stål, 1874, Enum. Hemip. 4, p. 121.—Van Duzee, 1917, Cat. Hem. N. Amer., p. 159.—Lindberg, 1935, Skrifter om Svalbard og Ishavet No. 65, pp. 11–17 (synonymy, life history, distribution, etc.)

Nysius ericae obscuratus Horvath, 1890, Rev. d'Ent. 9: p. 188 (*teste* Lindberg, 1935).

General color cinereous, in part heavily marked with fuscous as follows: Head, broadly, on either side of the middle testaceous portion, cicatrices broadly, and punctures of pronotum, the scutellum, corium with outer edge, veins, and posterior margin, conspicuously, venter of abdomen except for a few vague testaceous spots posteriorly, and spots on the femora which often merge to form a uniform color.

Head about one-third wider than long; bucculae, as in *ericae*, higher in front, gradually tapering posteriorly, ending at a point just a little before base of head. Antennae with second segment twice as long and the third nearly one-third longer than basal, terminal subequal to second segment. Pronotum nearly one-third and the scutellum about one-fifth wider than long. Corium contracted at base for a distance equal to two-thirds the length of scutellum, contracted part densely pilose; surface densely coated with fine, appressed hairs, usually devoid of longer erect hairs; maculae of veins often merge to form continuous lines. Membrane clear, faintly marked with fuscous along middle of disk; basal part from apex of commissure to apices of coria shorter than remainder of membrane beyond coria. Length, male, 4.10; female, 4.30–4.50 mm.

It is rather surprising that Lindberg followed Zetterstedt in relating this species to *thymi* rather than to *ericae* inasmuch as Horvath in 1890 recognized it as related to *ericae*. Horvath erected in *ericae* the variety *obscuratus* which Lindberg has cited as a synonym of *groenlandicus*. In fact, it is very closely related to *ericae*, having the general facies of larger, more pilose, darker specimens of that species.

Lindberg gives the distribution of *groenlandicus* as: Greenland, Hudson Bay Territory, Labrador (from Van Duzee), northern Norway, northern Sweden, northern Finland, northern Russia, Siberia, northern China, Turkestan, and northern India.

Recently received specimens from Dr. G. S. Walley, of Ottawa, extend the range of this species in Canada as follows: Churchill, Manitoba; Bradore Bay at the extreme eastern end of Quebec; and Prince Edward Island in the Gulf of St. Lawrence.

LIST OF SPECIES OF NYSIUS WITH SYNONYMY

1. *californicus* Stål, 1860
 major Berg, 1878
2. *californicus alabamensis* Baker, 1906
3. *basalis* Dallas, 1852
 ?*callifer* Stål, 1874
 ementitus Distant, 1893
 inaequalis Uhler, 1894
 californicus providus Baker, 1906 (not Uhler)
4. *adjunctor*, n. sp.
5. *angustatus* Uhler, 1877
 coloradensis Baker, 1906
6. *grandis* Baker, 1906
7. *thymi* (Wolff, 1804)
8. *ericae* (Schilling), 1829
 niger Baker, 1906
 angustatus of authors (not Uhler)
9. *raphanus* Howard, 1872
 destructor Riley, 1873
 strigosus Uhler, 1894
 minutus Uhler, 1895
10. *monticola* Distant, 1893
11. *tenellus*, n. sp.
 strigosus of authors (not Uhler)
 senecionis Baker (not Schilling)
12. *insoletus*, n. sp.
13. *groenlandicus* (Zetterstedt, 1840)
 ericae obscuratus Horvath, 1890

KEY TO SPECIES (MALES)

1. Bucculae very short, not extended beyond middle of gular region of head; basal segment of rostrum extended nearly to base of head.....2
- Bucculae much longer, well extended beyond middle of gular region, often reaching base of head, not at all or very little longer than basal segment of rostrum.....5
2. Pronotum distinctly, longitudinally calloused on each side of middle line; veins of corium very faintly, if at all, spotted; color pale testaceous.....*basalis* Dallas
Pronotum not distinctly longitudinally calloused; veins more or less heavily spotted with fuscous; color cinereous to fuscous...3
3. Costal margin of corium very slightly, if at all contracted at base; length 4.00 mm.....*adjunctor*, n. sp.
Costal margin of corium contracted at base for a distance equal to about one-third the length of scutellum. Length 4.75 mm or more.....4
4. Length 5.50-7.00 mm; distribution, western North America, Mexico, Central America, and South America as far south as Argentina.....*californicus* Stål
Length 4.75 mm; distribution, eastern North America, Dominican Republic, and Cuba; darker, with shorter antennae.....*californicus* subsp. *alabamensis* Baker
5. Bucculae high in front, slightly narrowing posteriorly, ending abruptly a little before (in *thymi*) or at base of head; scutellum and genital segment of male either entirely black or bicolored.....6
Bucculae low, gradually fading out to end at a point before base of head; scutellum and genital segment of male usually entirely black.....10
6. Pronotum, viewed laterally, distinctly depressed before cicatrices; contracted basal part of costal margin devoid of fine hairs; membrane clear; basal part between apex of commissure and apices of coria distinctly shorter than apical part of membrane beyond apices of coria; color typically pale yellow testaceous, with inconspicuous pilosity; length 3.60-4.00 mm.....*tenellus*, n. sp.
Pronotum, viewed laterally, not depressed anteriorly; contracted basal part of costal margin with fine hairs, often abraded; basal part of membrane between apex of commissure and apices of coria longer than apical part beyond apices of coria.....7
7. Large species, over 5 mm long; bucculae more strongly raised than in *angustatus*, their length is to the first segment of antenna as 28:20; pronotum wide, in relation to length it is as 70:45; color typically pale yellow testaceous with slight indications of maculae on the prominent veins; corium with very fine, short, appressed hairs; scutellum broadly pale on either side of middle; length 5.0-5.75. mm.....*insoletus*, n. sp.
Size usually smaller; relative proportions of pronotum and scutellum otherwise; bucculae shorter and less raised; color cinereous with more conspicuous fuscous punctations and maculae.....8

8. Form more robust; width of head across eyes is to the greatest width of pronotum as 50:60. Head and pronotum appearing more flattened; antennae longer, 2.80 mm; corium darker, somewhat rusty cinereous; scutellum entirely black; length 4.80–5.00 mm. *grandis* Baker
 Form less robust; width of head across eyes is to the greatest width of pronotum as 45:52; head and pronotum less flattened; antennae shorter, 2.12 mm; scutellum either entirely black or bicolored; size averages smaller, 4.00–4.30 mm long. 9
9. Contracted part of costal margin of corium usually shorter in relation to length of scutellum, about as 15:23, and in relation to the expanded part of costal margin, as 15:75; first segment of rostrum a little shorter than bucculae; scutellum bicolored; length, 4.25–4.50 mm. . . . *angustatus* Baker
 Contracted part of costal margin usually longer in relation to length of scutellum, about as 20:24 and in relation to the expanded part of costal margin, as 20:65; first segment of rostrum equal to or a little longer than bucculae; scutellum entirely shining black; length 3.60–4.00 mm.
 *thymi* (Wolff)
10. Pronotum short, nearly twice as wide as long (40:22) and subequal to length of head, costal margins of corium usually subparallel to each other, very little if at all expanded posteriorly; basal part of membrane from apex of commissure to apices of coria much shorter than apical part beyond apices of coria; smaller species 3.10–4.00 mm long. *raphanus* Howard
 Pronotum longer, much less than twice as wide as long (45:28) and usually a little longer than head; costal margins of corium not parallel to each other, parallel only at base, thence expanded posteriorly; basal part of membrane from apex of commissure to apices of coria more nearly equal to apical part beyond apices of coria; larger species 3.25–4.50 mm long. 11
11. Corium with erect hairs as well as dense coating of short appressed pubescence; length 3.80 mm. *monticola* Distant
 Corium with appressed pubescence, usually without erect hairs. 12
12. Corium and membrane more or less broadly infusate; contracted basal part of corium rather densely pilose; length, male, 4.10 mm; female, 4.30–4.50 mm.
 *groenlandicus* (Zetterstedt)
 Corium and membrane pale, with fuscous markings usually restricted to corial veins; contracted basal part of corium sparsely pilose; length 3.25–3.70 mm.
 *ericae* (Schilling)

ZOOLOGY.—*Notes on myiasis of the toad, Bufo boreas boreas Baird and Girard.*¹
 MAURICE T. JAMES, Colorado Agricultural Experiment Station, and T. PAUL MASLIN, Colorado A. & M. College.

On July 19, 1946, on a collecting expedition into Jackson County, Colo., the authors observed a case of myiasis of the mountain toad, *Bufo boreas boreas* Baird and Girard. The specimen was collected at an altitude of 9,500 feet in a small swampy meadow near the Columbine Camp Ground, Routt National Forest, U. S. Highway No. 40. When first sighted the toad lay extended on its side in the sun in a small semicleared area. Two large lesions were visible on the exposed flank. After the toad was captured, it was observed that these lesions were clean with smooth raised edges, each one measuring approximately 8 mm in diameter and containing a mass of small maggots. These were not counted, but it was estimated that there were approximately 30 in each lesion. The closely packed maggots were so oriented that their

posterior extremities formed a granular pavementlike surface in the opening of the lesion. In addition to these two a third lesion was found on the dorsal surface of the tibia; though smaller, it included about one-half of the tibial gland. One or two maggots were extracted and examined. This disturbance caused the rest of the maggots to move about restlessly and to work deeper into the lesions. The maggots were not all of the same size; they varied from approximately 3 to 4 mm in length. The toad, active and apparently normal in every respect, was placed in a damp bag with three other toads of the same species and brought to Fort Collins, Colo.

On July 20 the bag was opened and the specimens examined. The infected toad was less active than the other three, and its lesions, as well as the maggots within them, were appreciably larger. The flank lesions could be moved freely with the skin over the undamaged body wall beneath; but the

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